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[redacted]

[redacted]

[redacted] STAT

16 December 1965 STAT

STAT

STAT

Subject: [redacted] Progress Report - November 1965 STAT

[redacted] STAT

Gentlemen, STAT

Enclosed is a copy of [redacted] Progress Report for the period November 1965. Also STAT
included is our Finance Report for the month of November 1965.

Very truly yours,

[redacted] STAT

LHB/de

Enc: (1) P.R.
(2) F.R.

[redacted] STAT

Declass Review by NIMA / DoD

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DRAFT #2

MAY 21 1965

SUBJECT: JUSTIFICATION FOR INCREASED COSTS ON [redacted] CONTRACTS

Gentlemen,

At the end of June 1963 [redacted] entered into a contract with the customer for the [redacted] Machine. This contract is a fixed price redeterminable contract. The equipment to be developed and fabricated under the terms and conditions of this contract contains many design features which represent advancements in the state of the art. The basis for procurement, as specified in the contract [redacted] dated March 1963. As proposed, [redacted] intention to design this instrument as a modification to the [redacted] Stereo Viewer, which had been developed for [redacted] In the course of the development effort, primarily due to design review conferences with the customer, the [redacted] Machine has become virtually a new machine which required completely new state of the art design and extensive development in a number of areas. When the [redacted] contract was in process, [redacted] the customer entered into negotiations for additional machines which specified minor reduced capabilities of the [redacted] Machine. These machines were to be fabricated utilizing the [redacted] basic design and deleting certain non-required capabilities.

In December 1963, [redacted] the customer entered into a contract for a quantity of three (3) machines of this design. One (1) of the machines, which was designated Item II of the new contract, was to have shaft encoders on the objective head positioning lead screws for a readout to CFE. These machines were designated [redacted] As the program progressed, with continuous technical liaison between [redacted] engineers and the customer's technical representatives, it was decided that a fourth (4th) machine of the [redacted] configuration would be added to the quantity procured under the second contract.

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Therefore, in April 1964, by Supplemental Agreement #1, the quantity of that contract was increased to four (4) machines. It is evident from the foregoing that all technical people involved [redacted] engineers STAT and the customer's technical representatives, were satisfied with the progress of the job and did not anticipate any reason for delay in procurement of additional STAT equipments until the [redacted] Machine was completely developed. In subsequent months, it became evident that this was not the case, and, consequently, progress on all machines involved was delayed to complete final development in specific areas, which will be defined in detail below. In general, however, [redacted] STAT continued fabrication and assembly on all five (5) machines in order to do everything possible to protect the delivery schedule for the units.

It is felt that many of the technical problems involved were unforeseeable even when sound engineering practices were used throughout the STAT conduct of the program and [redacted] is herein soliciting reconsideration by the customer of the contract terms and conditions, in order to avoid a catastrophic economic loss on these contracts.

<u>This potential loss is caused by two (2) factors</u>:

STAT The first is the fact that the development, which has taken place [redacted] is of such a nature that it should have been covered by a cost reimbursement type contract, since the costs associated therewith were unpredictable at the time of the contract.

STAT The second area is the cost of the rework of the [redacted] machines, which were contracted for prematurely, since the nature and extent of the development involved was not recognized by either party to the contract. A careful analysis of the cost quotations agreed to on the

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STAT [ ] procurement will show that the only engineering time estimated was that necessary to monitor fabrication, assembly, and test of the machines. The only design engineer and designer time available was that necessary to revise the drawings to delete items which were part

STAT of the [ ] configuration, but not a part of the [ ] configuration. STAT This was obviously a procurement for producing similar machines from a stable existing design.

Listed below are the items which have cost additional development time over and above that which was proposed and anticipated at the time of contracting.

ITEM I - THE JOYSTICK CONTROL FOR OBJECTIVE HEAD DRIVES

This sophisticated drive system allows scanning in stereo regardless of difference in magnification and orientation of the formats being scanned. As proposed, this system utilizes stepping motors, controlled by variable frequency oscillators, to drive the lead screws through two-speed gear boxes. In finalizing the design of this system, [ ] used the best STAT

STAT available stepping motors. With these motors and the two-speed gear box, it it was possible [ ] to provide adequate speed coverage over the specified magnification range of 5X to 125X (25:1). Subsequent to submittal of STAT the proposal, it was requested [ ] include a fourth (4th) objective lens which would provide a low magnification range for the system. On an expedited

STAT basis [ ] quoted the relatively simple job of inclusion of the fourth

STAT lens at a price [ ] which was accepted by the customer. This revision to the proposed design did not include any change to the specified operational parameters throughout the optical magnification range of 5X to 125X. Contrary to the manner in which this change was requested, proposed, and quoted the customer's

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technical representative has insisted on conformance to the specification, both for optical quality and scanning system operation throughout the new optical magnification range which is greater than 60:1.

From a technical standpoint his position cannot be criticized; however, this has caused a major redesign effort on the part [ ] in STAT the area of the synchronized drive system. In addition, it has also brought about a requirement to incorporate this redesign in five (5) machines. In order to act in the best interest of the customer, [ ] has performed this effort, STAT
STAT but [ ] position that such an effort is only justifiable on a cost reimbursement basis since the requirements of the contract do not provide STAT
STAT for such performance over the increased magnification range. Also, the costs of incorporating this change into the [ ] machines is reimburseable [ ] because there has been a design change initiated by the customer on the basic [ ] Machine. STAT

ITEM II - SYSTEM OPTICAL PERFORMANCE AT THE LOW MAGNIFICATION RANGE

It has been necessary [ ] to expend considerable STAT development effort on the optical system in order to produce high quality imagery throughout the entire range. It must be understood that the field of view at the lowest magnification (below 5X), which covers an entire 70 mm film format, requires considerable analysis and design effort to avoid excessive aberrations and fall-off of light intensity. This has had a basic effect on design of the high intensity light source, as well as the objective lens itself. It has also led to design compromises which have adversely affected the light available at the highest specified magnification. In effect, it has resulted in problems at both the high and low ends of the magnification range which have taken considerable time to be corrected and which have to be incorporated into five (5) machines. It is

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necessary to refer again to a change which was quoted simply as the addition of the fourth objective lens and which has resulted in a major development effort in the optical area, because of the customer's insistance on high quality performance throughout an optical range which has been increased approximately 2½ times. It is obvious that this task was never included in the initial proposal nor was it included in any change which has been negotiated to date in the contract. Therefore, it is an added task with an equitable cost reimbursement.

ITEM III - VACUUM HOLDDOWN SYSTEM

STAT As proposed [redacted] the Vacuum Holddown System STAT
[redacted] was to utilize a microgroove plate manufactured [redacted] STAT
STAT Although [redacted] did not procure the microgroove plates [redacted] STAT
STAT [redacted] the plates, which were procured, were unacceptable to the customer's technical representative. The reason for these plates being unacceptable is that the grooves are visible in the viewing system where they appear as areas of greater film density or lower light level in the imagery. It is [redacted] STAT
STAT [redacted] contention that no groove system could be fabricated which would be acceptable in this system as long as this criteria for rejection is used. ~~An additional item of task which was not covered by the specification was to make the film edge guide transparent~~. Therefore, the development of an acceptable Vacuum Holddown System required eight (8) months of development effort and
STAT repeated rework [redacted] to satisfy the customer's technical representative. This unanticipated development effort should be reimburseable.

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ITEM IV - JOYSTICK SMOOTHNESS

When the customer's technical representative first operated the system he noticed that there was less resistance ~~for~~ TO motion of the Joystick along principal axes (X and Y). Although this was a relatively slight effect there was a tendency for the operator to move the Joystick along the ADJACENT axis when his intention was to move at a slight ANGLE to the axis. To correct this problem it was necessary to expend considerable effort in reworking Joysticks for all machines. Although the design effort was not major, the need to rework all assemblies significantly increased the cost. Therefore, [redacted] feels STAT that this task should be reimburseable.

ITEM V - MODIFICATION OF FILM TRANSPORT TO INCORPORATE 20' LOOP

The contract states: "It is anticipated that the parties shall promptly negotiate to increase the size of the loop, probably to a 20-foot size." During negotiations in the May 24, 1963 letter [redacted] STAT proposed a design and cost quotation for this purpose. Subsequent to issuance of the contract, with the words as stated, the approach to increase in size was coordinated with the customer's technical representative at which time this change was finalized, but no renegotiation of cost has taken place to date. It is felt that this renegotiation is in order.

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SUMMARY

In summary, [redacted] position is as follows: STAT

The contracts [redacted] were entered into STAT

STAT in good faith by both [redacted] with the understanding that the task proposed was a ~~logical~~ task WHICH SHOULD be accomplished on a fixed price basis. Subsequent to these agreements, it has become evident that arrival at a configuration satisfactory to the customer's technical representative contains large elements of tasks which were nondeterminable at the time of contracting and, consequently, should be done on a cost reimburement basis.

In effect, certain of these tasks are clearly added tasks in relation to the contract terms and conditions. Although they have been

STAT accomplished [redacted] to date, without contractual revision, recent analysis of the cost situation on the contracts indicates a potential company investment which is extremely large and unwarranted under the circumstances. Therefore, it is respectfully requested that both contracts be revised to incorporate an equitable cost increase ~~to reflect~~ COMMENSURATE WITH the task as it is now known.

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STAT

SPECIFICATIONS OF THE [redacted] HELIUM-NEON GAS LASER

Output Wavelength - 6328Å

C/2L mode spacing - 300 mcs.

Power output - 1/2 mw

Tuning range - ± 150 mc (min.) single mode

Tuning rate - DC to 100 kc

Output polarization - 100% lin.

Output Frequency stability - better than 2×10^{-6} at constant exciter power in ambient air varying not more than 10°

Input power requirements - 110V AC - 10%, 50 to 60 cps at 1.2a

Warranty on tube life - 1000 hours continuous operation

Mounting - three-point support with individual screw adjustment

DESCRIPTION OF LASER COMPONENTS

STAT

The [redacted] consists of three assemblies. Optical resonator, plasma tube and the tuning exciter unit. Modular in construction, each of the assemblies are easily interchanged to user's specifications. The optical resonator consists of two opposing multi-layer dielectric reflectors. A 61 cm radius concave sphere and a $\lambda/20$ flat. The structure which mounts the reflector spacing consists of a quartz tube 58 cm in length on the ends of which are mounted stainless steel end caps. The structure is temperature-compensated to restrict reflector spacing changes to less than 10^{-6} fractional parts per degree of ambient temperature change.

Alignment is easily achieved with the mechanical adjustments provided. The [redacted] utilizes piezo-electric elements for electronic stabilization and modulation. In addition, it retains all mechanical tuning features.

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STAT

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Specifications Remove Blue Backing Paper and lay this

Wave Length - 6943Å

Pulse Length - 500 μ secs (approx)

Repetition Rate - Uncooled - 1 per minute
Cooled - 1 pulse every 2 secs.

Power Output - 0 - 25 millijoules

Power Input - 200 joules (max)

Threshold - 100 joules

Dynamic Range - 10-1

Effective Beam Diam. - 4-5 mm

Beam Divergence - 5 milli radians (nominal)

Weight - Laser Head - 12 oz.

Weight - Power Supply - 12 lbs.

Ruby Size - 1 1/2" x 1/4"

Coating - Dielectric

Features

Remote Triggering Cable

Barrel Mount

Safety Interlock

Large Input Meter

Provision for cooling by air - vacuum - auxiliary pump

Uses

Classroom Experiments

Bio Medical

Maintaining Beam Colimation

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STAT

The [redacted] laser system is a pulsed ruby system capable of up to 3 joules output at 6943Å. Accessories are provided for Q Switching with pulse widths as short as 30 to 40 nano seconds. The system consists of the following units.

STAT

[redacted] Laser Power Supply

Specifications

Input:

Voltage: 115V AC ±10%, cps, single phase
Power: 1,000 watts maximum

Energy Output: 0 to 900 joules @ 900 Volts
225 Max. per bank x 4 banks (one for each lamp)

Meter (non-linear scale): 400 to 900 joules

Recycle Time: 10 seconds

Sync Pulse: Negative Pulse - 10 volts peak from a 10 K source

Remote Triggering: The unit can be fired by activating Remote SPST Push Button

Warning Lamps: The lamp begins to flash when the capacitors are charged to 940 volts. The absolute maximum voltage across the capacitors can never exceed 950 volts. This is equivalent to 250 joules per bank.

Interconnecting Cables:

1. - Line cord supplied
2. - Cable and connectors supplied to connect 104-002 RUBY LASER to power supply.

Interlocks:

Discharge capacitor banks when:
- chassis is opened
- fuse blows
- HV switch opened
- line cord (AC) removed
- main cable removed
- AC switch opens

Mechanical Characteristics:

Size - 21 1/2" wide x 13" high x 15" deep

Case - Steel; blue wrinkle finish; ruggedized construction

Weight rack mount - 58 lbs.

Mounting - Standard 19" rack

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Environmental Characteristics:

Operating temperature range - -10° C to + 30° C ambient
Operating humidity range - 50% relative humidity at -10°C
90% relative humidity at +30°C

STAT [redacted] LASER HEAD

Output - 3 joules normal, 1/2 joule Q-switched with QS-1 Switch
Input - 1800 joules (450 each to four lamps)
Lamp Cavity - Four confocal cylindrical coated optical reflectors
Lamp Type - Straight tube, 3 inch arc, 400 joule rating
Ruby Size - 7.3 cm long x 1 cm dia
Threshold - 350 joules input
Output Wavelength - 6943Å
Cooling - Integral blower 15 cfm. room air
Duty cycle - 6 ppm
Output beam width - 10 milliradians
Lamp replacement - plug in without wire connections
Connector - AN to cable connects to 104-001 power supply for all inputs
STAT Q-Switch Provision - [redacted] Q-Switch mounts directly on rear of head. Blower remounts on Q-Switch

MEGAPULSE Q-SWITCH [redacted] STAT

Introduction

STAT

Basically, a high-speed rotating [redacted] angle prism energized by the LASER supply, this power intensifier package is completely
STAT compatible with the [redacted] LASER system and can be installed in minutes without modification.

Ruby, neodymium glass, or other LASER rods can be used by adjusting the pre-pumping interval.

A control is provided to vary the pre-pumping interval over a range of 500 to 900 micro seconds for maximum output power. An external synchronization signal is also provided, through a BNC connector, 35 micro seconds prior to the output LASER pulse. The Q-Switch package contains a locking device which automatically aligns and locks the prism in the oscillating position to allow operation in the normal mode with the prism serving as a total reflector. Pulse length 40 nano seconds or less (Q-switched).

Installation

The Q-switch package can easily be installed or removed from the
STAT [redacted] LASER source at any time without disabling the LASER unit.

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Theory of Operation (Q-Switched Mode)

Q-switching or Q-spoiling is accomplished by means of a [redacted] STAT angle prism rotating at 30,000 rpm. The prism, rotor, and hysteresis driving motor form a carefully balanced rotating unit supported by high-speed bearings.

A small permanent magnet mounted in the rotor produces a magnetic field as the rotor turns, which induces a pulse of current into two magnetic record heads mounted on the Q-switch housing. One of the magnetic heads is mounted on a movable frame and can be positioned by turning the TIMING KNOB located on the side of the MEGAPULSE unit; the other magnetic head is fixed in place.

The Q-switch unit is mechanically aligned so that, when the prism is spinning at 30,000 rpm, the pulse out of the trigger pulse driver generated by the movable head can be adjusted by means of the TIMING KNOB to occur from 500 to 900 micro seconds before the prism has rotated into the oscillate position. The amount of delay until the prism is in the oscillate position can be read directly from the timing scale, calibrated in micro seconds, on the side of the housing. The fixed magnetic head and blocking oscillator combination produces a pulse at the input of the AND circuit approximately 35 micro seconds before the prism has rotated into the oscillate position. The AND circuit passes the signal to the SYNCH OUTPUT only if the trigger switch on the [redacted] power STAT supply has been closed. A typical sequence of operation after the trigger switch has been closed is described below.

Pulses are produced in the output of both the trigger driver and blocking oscillator for each revolution of the motor. Since the motor is synchronous at 30,000 rpm, the pulse period is 2 m sec. The output of the trigger pulse driver is fed back to the power supply through the interconnecting cable. When the trigger switch (on the front panel or external) is closed, this signal triggers the circuits which ionize the flash lamps and cause the optical pumping to begin.

Because of the mechanical alignment, this occurs 500 to 900 micro seconds (depending upon the setting of the TIMING KNOB) before the prism is in the oscillate position. Coincident with the start of the optical pumping, a pulse is fed back from the power supply to start the stretched gate generator. A gate is produced that will overlap the blocking oscillator output. Since this gate is present only when optical pumping, and hence LASER action occurs, the AND circuit will produce a Sync output during this time. Finally, the prism rotates to the oscillate position, and a LASER output is obtained.

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Size - 3 1/2 x 3 1/2 x 7 1/2
Weight - 2 lbs.
Motor Speed - 30,000 rpm
Motor Input - 115V 500 cps from [redacted] Laser power supply STAT
Reflector - Roof prism with [redacted] angle face STAT
Synchronization - 1. Variable pre-pumping interval 500 to 900μ sec. calibrated and direct reading.
2. Fixed Scope Synch 35μ sec ± .1μ sec., 2 volts across 10K, 10 n-sec rise time.
Disabling - Prism locks in fixed reflector position
STAT Mounting - Directly to [redacted] laser head. Blower then mounts on side of Q Switch.

STAT [redacted] AUXILLIARY STORAGE

Output - 900 joules in 4 banks of 225 joules each
STAT Input - Banks charged by [redacted] power supply
Meter - Each bank voltage is indicated on front panel meter
Connector - Cables connect directly to [redacted] power supply STAT
Interlock - When connected to [redacted] all interlocks operate STAT
STAT on [redacted] as well.
Size 21 1/2" wide x 13" high x 15" deep
Weight - Rack mount - 35 lbs.
Case - Steel, ruggedized construction

STAT [redacted]

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PRELIMINARY 12/6/67

INSTALLATION ENGINEERING

I. INSTRUMENT
A. Name VIEWER STEREOSCOPIC. VERSATILE HIGH PRECISION
B. Manufacturer [redacted] STAT
C. Contract Number

II. PHYSICAL FEATURES
A. Number of Component Parts 4 {(3) MOBILE UNITS (1) DROP-IN ASSY
B. Dimensions of the Largest Component Part:
Length 7 Ft. 4 In. Height 6 Ft. 0 In.
Width 3 Ft. 0 In.
C. Weight of Largest Component Part ~ 2500 Lb.
D. Total Weight of Instrument ~3500 Lb.
E. Overall Dimensions Assembled: FLOOR SPACE
Length 12 Ft. — In. Height 6 Ft. 0 In.
Width 6 Ft. — In. → AT LEAST 3 FT FROM WALL
F. Type of Base of Mount:
Flat _____ Three Point Suspension _____ Four Point Suspension ✓
G. Does Instrument have built-in mobility? YES
H. Is the instrument particularly sensitive to vibration? YES
I. Are any special or unusual tools or fixtures necessary or adviseable for the installation or maintenance of this equipment? PRECISION LEVELS (4) .0005"/FT MIN. SENSITIVITY

III. UTILITIES
A. Electrical:

	AC	DC
Voltage	115 Volts ± 10 Volts	—
Current	30 Amps	—
Frequency	60 cps	
Nr. of phases	1	
Nr. of wires	2 + GROUND	
Power required by equipment	~3000 Watts	— Watts

Type of outlet required: Two Prong _____, Three Prong _____
Twist Lock 30A HUBBELL, Permanent Installation _____

Should the equipment be shielded, either from external electromagnetic signals, or to prevent interference with other equipment?
SOME RFI MEASURES HAVE BEEN TAKEN, BUT EQUIP CONFIGURATION PREVENTS COMPLETE ISOLATION.

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B. Air Conditioning:
Room temperature 70°F ± 10°F Humidity ~ 50%
Output of Instrument ~ 3410 BTU/Hr.
If air must be filtered, what is maximum permissible particle size in microns? 1 What particle count? ~ 100/ft³ particles per cubic foot.
Direct connection to instrument? Yes _____ No ✓
If yes to above, what is the desired air temperature to instrument?
N.A.
Should discharged air be ducted separately? N.A.
Is discharged air noxious? N.A. toxic? N.A.
Connector size to instrument N.A.

C. Plumbing: N.A.
Is water required for the instrument? Yes _____ No ✓
Water pressure _____ Flow in GPM _____
Type of water desired:
Tap _____ °F ± _____ °F
Tempered _____ °F ± _____ °F
Deionized _____ °F ± _____ °F
Filtered _____ °F ± _____ °F Particle size and count per unit volume.
Type of pipe required:
Galvanized _____ Copper _____
Stainless Steel _____ Plastic _____
Is floor drain required? Yes _____ No _____
Diameter of drain _____ Galvanized drain _____
Plastic drain _____ Glass drain _____

D. Compressed Air: N.A.
Diameter of connectors _____ Type of connectors _____
PSI _____ Water free? _____
CFM _____ Oil free? _____

E. Vacuum: N.A.
Is vacuum required? Yes _____ No _____
Vacuum required _____ PSIA or _____ (inches) (millimeters) of Hg
Displacement _____ CFM _____

IV. REMARKS

In the event additional space is required for environmental conditions or utilities not mentioned above, use the reverse side of this form.

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